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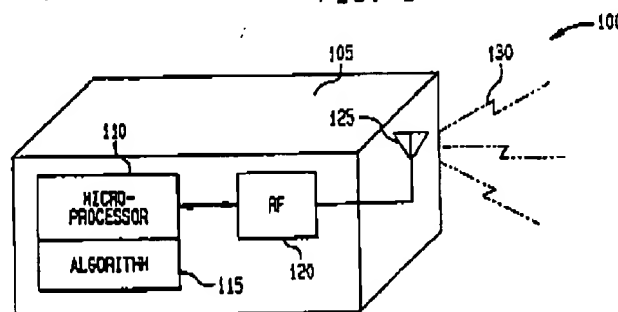
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(54) System and method for radio frequency tag group select

(57) A system and method is disclosed for selecting certain subgroups of radio frequency (RF) tags for querying, communicating, and/or identifying by a base station. The base station sends commands to a group tags within a RF field of the base station. The tags use control logic to determine whether or not they meet certain cri-

teria sent out by the commands. This may cause the tags to change state which either prevents or allows a given tag to participate in an identification process. In this way, a given subgroup(s) of tags meeting certain criteria can be selected for querying, communicating, and/or identifying.

FIG. 1



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command 510 - group select
 function 515 - equals
 address 520 - address including the color field in tag data memory
 mask 525 - mask of the actual color bytes in tag data memory
 data 530 - code indicating pale green

Similarly, the command to unselect pale green items would be:

command 560 - group unselect
 function 565 - equals
 address 570 - address including the color field in tag data memory
 mask 575 - mask of the actual color bytes in tag data memory
 data 580 - code indicating pale green

Figure 6 describes the base station algorithm.

The first step, 605, is a group select command. This moves a subset of tags from the READY state to the SELECTED state. This group select step 605 can be repeated any number of times as required, 615, to move more tags from READY to SELECTED. This performs an OR function.

The next step, if required, is 610. This group unselect command acts on the tags in the SELECTED state. A subset of them moves back to the READY state. This performs an AND function. This group unselect step 610 can be repeated any number of times as required, 620, to move more tags from SELECTED to READY.

For example, to select socks and shirts, one group select command 605 selects socks. Through 615, another group select command 605 selects shirts. The result is that items which are shirts OR socks are selected.

In another example, to select pale green pants, a group select command 605 selects pants. Then a group unselect command 610 unselects not pale green. The result is that items which are pants and pale green are selected.

After the tags now in the SELECTED state are accessed, the entire selection process can be repeated as required, indicated by the path 625.

In a typical application, accessing the tag could consist of identifying individual items and reading a universal product code (UPC).

This flexibility allows tags to be selected using an arbitrarily complex logical equation.

For example, it would be possible to identify all pale green pants sizes 30 through 34 manufactured in Connecticut or mens socks manufactured between January and March.

In one application, querying, a flag is set if the selected subgroup has one or more members. In that application, tags remaining in the SELECTED state after processing a group select or group unselect command would transmit back to the base station.

The base station, in 630, would detect the presence or absence of a return signal from one or more tags. If a signal is detected, a flag is set in 635. If a signal is not detected, the flag is cleared in 640. The flag state can be determined without identifying individual tags. In other words, the base station has queried the tag group to determine if any tags met certain conditions (or criteria) without ever identifying a tag.

For example, an application could scan a display of pale green pants for misshelved items. The application would first group select on not pants. A set flag indicates the presence of not pants tags, and the application knows that items are misshelved. If the flag is not set, the application next group selects pants and then group unselects pale green colors. A set flag now indicates the presence of pants which are not pale green. Again the application knows that items are misshelved.

In another application, the flag is an alarm. The selection conditions are arranged by the application so that the only tags remaining in the SELECTED state are those tags for which security is being breached. In that case, in step 645, the application would check the flag. If the flag is set, the application implements its alarm procedure 650.

For example, an application could group select all retail items, followed by a group unselect on items marked paid. A set flag indicates unpaid items passing through the field, which can be used by the application to trigger an alarm.

Given this disclosure, one skilled in the art could construct other embodiments that are equivalent to those disclosed here. These embodiments are within the contemplation of the inventors.

Claims

1. A method of selecting subgroups of a group of radio frequency tags comprising the steps of:

- sending a group select radio signal command from a base station to a plurality of radio frequency tags, the command defining certain selection conditions, the tags each having a radio frequency communications component for receiving the command and a tag memory with tag fields;
- changing a state of one or more tags in the group of tags, the state change being from a READY state to a SELECTED state, the tags changing state being a selected subgroup of tags from the group of tags, and the selected tags having data in their respective tag memory that meets the selection conditions.

2. The method of claim 1, where the selected tags send a tag identifier to the base station.

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3. The method of claim 1, where the selected tags change data in one or more tag fields of their respective memory.
4. The method of claim 1, where steps a and b are repeated one or more times to create a ORed subgroup which includes the union of the tags of each of the subgroups.
5. The method of claim 2, where the tags are queried to indicate that the selected subgroup has one or more members.
6. The method of claim 5, where a flag is set if the selected subgroup has members, the flag being an alarm and the selection condition being that there was a security breach.
7. The method according to any one of the above claims, wherein
- in step a. the command defining certain logical selection conditions; and
- in step b. the tags changing state being a first selected subgroup of tags from the group of tags;
- the method further comprises the steps of:
- c. sending a group unselect radio signal command from a base station to a plurality of radio frequency tags, the command defining certain logical unselection conditions; and
- d. changing a state of one or more tags in the first selected subgroup of tags, the state change being from the SELECTED state to the READY state, the remaining tags in the SELECTED state being a second selected subgroup of tags, the tags in the second selected subgroup having data in their respective tag memories that meet both the selection and unselection conditions.
8. The method of claim 7, where steps c and d are repeated one or more times to create an ANDed subgroup which includes the tags in the intersection of each of the second selected subgroups.
9. The method of claim 7, where the selection conditions are one or more of the logical comparisons including greater than, less than, equal, not equal, greater than or equal, and less than or equal.
10. The method of claim 9, where the comparison is made between a data value sent from the base station and a tag value stored in the tag memory.
11. The method of claim 10, where the tag value is a value obtained by masking in the tag.
12. The method of claim 7, where the unselection conditions are one or more of the logical comparisons including greater than, less than, equal, not equal, greater than or equal, and less than or equal.
13. The method of claim 12, where the comparison is made between a data value sent from the base station and a tag value stored in the tag memory.
14. The method of claim 13, where the tag value is a value obtained by masking in the tag.
15. A system for selecting subgroups of radio frequency tags from a group of tags, comprising:
- a. a base station for communicating radio frequency commands to the tags, the commands comprising command type, function, tag memory address value, and command data;
- b. a plurality of tags having radio frequency component for receiving the radio frequency commands from the base station and sending radio frequency information to the base station, a tag memory with a tag memory address and tag memory data, tag control logic, a tag compare function, and a tag state, whereby the command type sent by the base station causes the tag control logic to perform the function sent by the base station in the tag compare function to compare tag memory data located in the tag memory address specified by the tag memory address value with the command data, and if comparison conditions are met, the tag control logic causing the tag state to change.
16. The system, as in claim 15, where the command type is a select command and the tag logic causes the tag to move from a READY state to a SELECTED state; or where the command type is a unselect command and the tag logic causes the tag to move from a SELECTED state to a READY state.
17. The system, as in claim 15, where the tags identify clothing.
18. The system, as in claim 16, where the base station queries the tags in the SELECTED state.
19. The system, as in claim 18, where an security alarm is enabled if there are any tags in the SELECTED state.

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EUROPEAN SEARCH REPORT

Application Number
EP 95 11 2672

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 285 419 (SATELLITE VIDEO SYSTEMS LTD) 5 October 1988 * column 3, line 53 - column 4, line 12; figures 2,3 * * column 5, line 60 - line 65 * ---	1,2,15, 16,18	G06K17/00 G06K7/10
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			G06K G01S G08B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 January 1997	Examiner Chiarizia, S
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background Q: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: documents cited in the application L: document cited for other reasons A: member of the same patent family, corresponding document			

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